

# BERBERIS SAWFLY, *ARGE BERBERIDIS* SCHRANK (HYMENOPTERA: ARGIDAE), A PEST NEW TO BRITAIN

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## ABSTRACT

Berberis sawfly, *Arge berberidis* Schrank, has larvae that cause severe defoliation on some *Berberis* and *Mahonia* spp. In Britain, it was first recorded in Essex, England in 2002 but had probably become established in or before 2000. It is now known to be present in the vice counties of Berkshire, Buckinghamshire, Hertfordshire, Middlesex, South Essex and Surrey. Information is given on the biology and identification of this insect.

## INTRODUCTION

*Arge berberidis* Schrank is widely distributed in Europe. Liston (1995) records it from Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, France, Germany, Holland, Hungary, Latvia, Luxembourg, Poland, Romania, Russia, Spain, Switzerland and Ukraine. He gives the host plants as *Berberis vulgaris* L., *B. thumbergii* DC. and *Mahonia* spp. Muche (1977) gives the distribution as Central and South Europe (including the Crimea), Caucasus, Transcaucasus, Central Asia and Siberia. There is some evidence that *A. berberidis* has extended its range northwards in recent years. Until 1990 it was considered a rare insect in Holland but since 1996 it has been a significant pest in the province of Limburg and the Wageningen area (Frankenhuyzen & Blommers, 2000).

## OCCURRENCE IN UK

The presence of this sawfly in Britain was established when a female was sent for identification to the Entomology section at the Royal Horticultural Society Garden, Wisley. The specimen came from a private garden at Church Langley, Essex where a plant of *Berberis thumbergii* f. *atropurpurea* (Chenault) had suffered bouts of defoliation by 'caterpillars' since 2000. The discovery was reported to the Plant Health and Seeds Inspectorate but the pest was found to be too widespread in gardens for eradication to be feasible. Other reports of sawfly larvae defoliating *Berberis* were received at Wisley Garden during 2002 from Hertfordshire, Middlesex, Berkshire, Buckinghamshire and Surrey. Several of these records referred to damage occurring from 2000 onwards. It is likely that *A. berberidis* was imported into Britain with infested nursery stock in 2000 or the late 1990s.

The vice counties and localities for *A. berberidis* reported to the Royal Horticultural Society up to the end of October 2003 are:

Berkshire: Holyport, near Maidenhead; Maidenhead; Reading.

Buckinghamshire: Beaconsfield; Chalfont St Giles; Fenny Stratford; Great Missenden.

Hertfordshire: Cuffley; Lemsford Village; Royston; Stevenage; Tring; Welwyn; Welwyn Garden City.

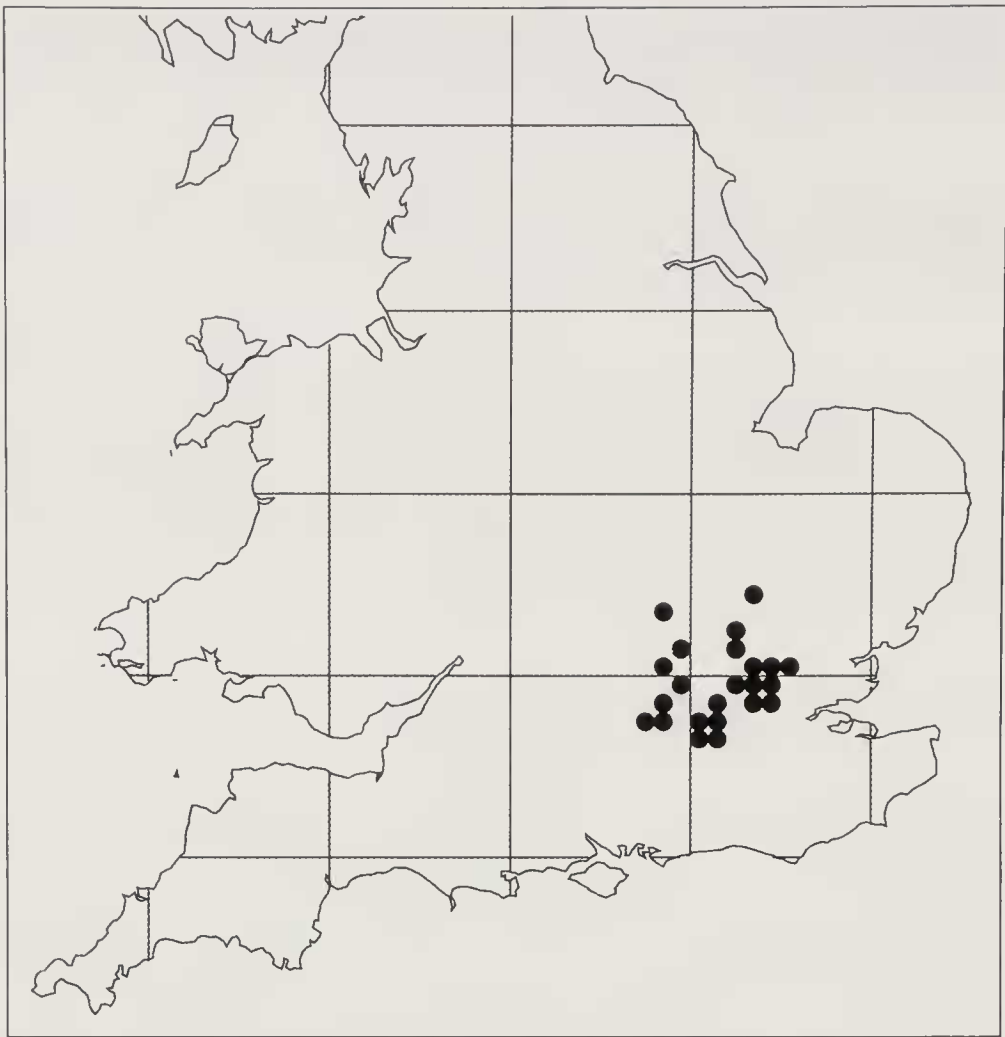


Fig. 1 Distribution map of *Arge berberidis* in England (prepared with DMAP program)

Middlesex: Mill Hill; Winchmore Hill; nr Alexandra Park; North Finchley; Teddington; Hayes; Muswell Hill; Ruislip; Ealing; Hounslow; Hackney; Hampton.  
 North Essex: Tylers Green, near North Weald.  
 South Essex: Church Langley, near Harlow; Seven Kings; Loughton.  
 Surrey: North Sheen; Thames Ditton; Weybridge.

The distribution of these records is shown in Figure 1. All of the above records refer to infestations on *Berberis*, except at Cuffley, Hertfordshire where damage occurred on an unspecified *Mahonia*.

#### BIOLOGY

Some observations were made on the biology of this sawfly. Eggs are deposited in batches of up to seven near the leaf margins on *Berberis thunbergii* leaves. When presented with young leaves of *Mahonia aquifolium* (Pursh) Nutt., females readily used these for laying eggs. Eggs are inserted under the epidermis, usually on the underside of the leaf, where they form small raised areas. The elongate eggs are visible through the epidermis. Unmated females can lay viable eggs but these eggs produce only male adults. The eggs hatch after 7–8 days and the larvae begin feeding gregariously from the leaf margins. First instar larvae have black heads with whitish semi-transparent bodies that show the gut contents. The body is marked with black

dots but lacks the yellow markings of the older larvae. After 7 days the second instar is reached and these larvae have large pale yellow blotches on the upper part of their bodies; these markings are more pronounced on the abdomen than the thorax.

Final instar larvae are 18 mm long with black heads and creamy white bodies. The true legs are greyish black and darkest on the femora. The body has a double row of small black dots down the dorsal line with a large yellow blotch on either side on each segment. The sides of the body have many small black spots bearing short upright black bristles. There is a row of larger black spots along the lower lateral part of the body. The dorsal surface of the anal segment is black but the ventral surface is yellow. The first thoracic segment is also mostly yellow down the lateral area.

When fully fed the larvae moult to the pre-pupal form and go down into the soil where they pupate within silk cocoons. Larvae kept at room temperature (15–23°C) completed their feeding in 19 days and adults began emerging 18 days later. In Holland a natural infestation was watched throughout the late spring to early autumn of 1998 by Frankenhuyzen & Blommers (2000). They found that adult sawflies began emerging in late April with a peak in early May. Larvae of the first generation were present from mid May–June. Second generation adults emerged in early July–August, with more larval activity in August–September. They also noted that there can be a partial third generation of larvae in October. The Royston, Hertfordshire record was of first instar larvae on *B. thunbergii* f. *atropurpurea* seen on 12.x.03. This is a deciduous plant and it is possible it may shed its leaves before the third generation larvae can complete their feeding.

#### IDENTIFICATION

The adult female sawfly is 9 mm long (frontispiece); the males are 7 mm long. The head and body is shiny bluish-black; the antennae and legs are also black. The wingspan is 14–15 mm and the wings are infuscate, especially at the basal and costal parts of the forewings. The female has a pale yellow vesicle which can be distended from the anal segment above the saw-sheath. In dry specimens this can be seen as a white membranous area. *Arge berberidis* would key out in the Royal Entomological Society's keys (Benson, 1951; Quinland & Gauld, 1981) as *Arge nigripes* Retzius. *Arge berberidis* is slightly larger and has darker wings but it is necessary to look at the genitalia to separate these species. Females are readily distinguished because of the very different shape of the saw-sheath (Fig. 2). The saw in both species has barely perceptible teeth. The saw of *A. nigripes* is shorter and thicker with a rounded tip, and is uniformly brown. That of *A. berberidis* has golden brown and white banding and is longer and thinner with a more pointed tip. Males can be separated by the shape of the penis valves (Fig. 3), which are most easily seen by extracting them from fresh specimens. Those of *A. berberidis* have a more rounded tip and a shorter spur on the dorsal surface.

The two versions of the RES sawfly key covering the Argidae use similar wording but in Benson's key, *nigripes* keys out at couplet 8, whereas the more recent key by Quinland & Gauld has it at couplet 7. Note that there is an error in the latter key at couplet 1; species with metallic blue, green, bronze or black (not yellow) abdomens go on to couplet 5, not 6. To incorporate *A. berberidis* into the Quinland & Gauld version of the key, the following addition should be made:

- 5 Wings more or less strongly infuscated with a black stigma; pubescence on face and mesopleurae reddish-black, legs entirely black or reddish-black . . . . . 6

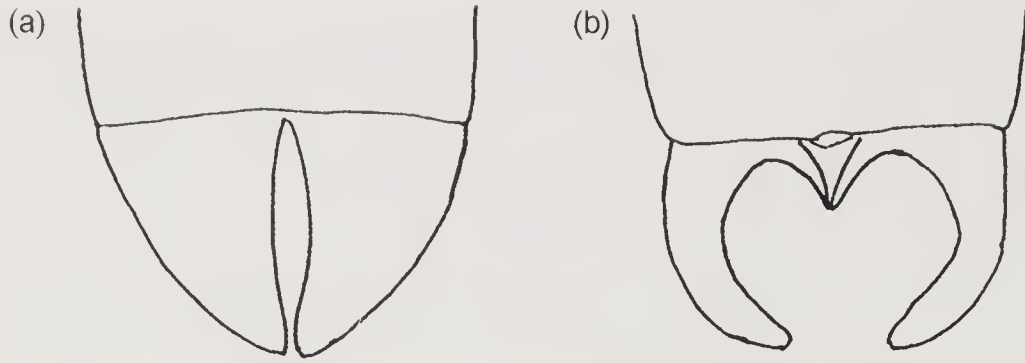


Fig. 2 Female saw-sheath, dorsal view (a) *A. nigripes* (b) *A. berberidis*

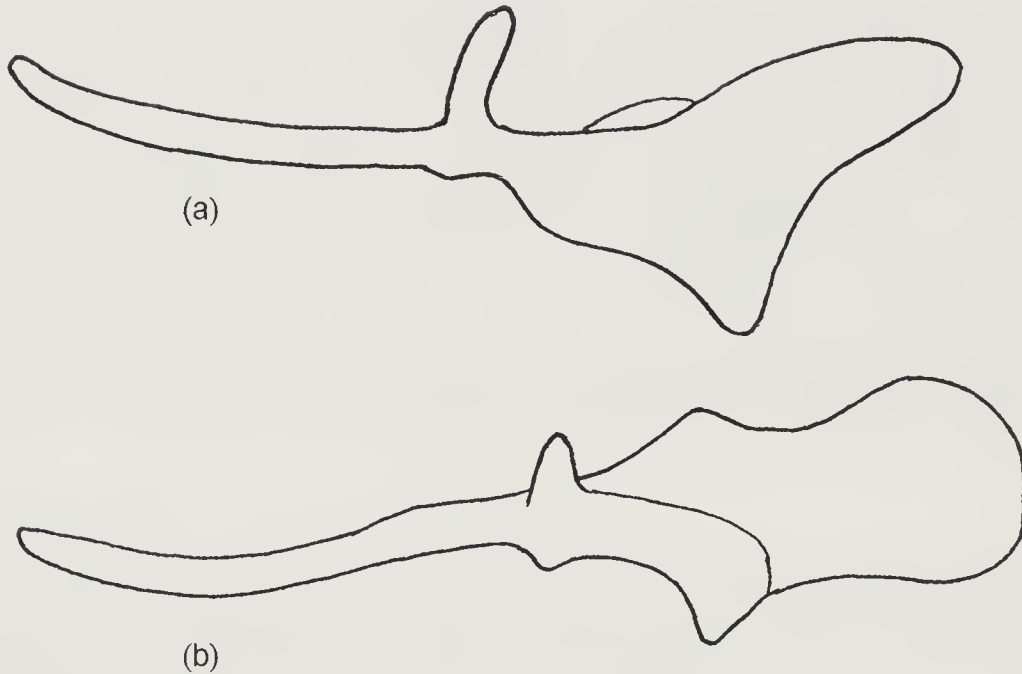


Fig. 3 Male left penis valve (a) *A. nigripes* (b) *A. berberidis*

- Wings subhyaline, yellowish or brownish; pubescence at least on face and mesopleurae silvery white; legs usually partly pale . . . . . 8
- 6 Vein 3 rm in forewing straight, angled or curved, but cell 2 RS is about as long above as below . . . . . 7
- Vein 3 rm in forewing straight, angled or curved but cell 2 RS is longer above than below . . . . . **gracilicornis** (Klug)
- 7 Vein 3 rm of forewing straight, apex of forewing below stigma subhyaline, and strongly contrasting with the deeply infuscate base; female with saw-sheath very bluntly rounded apically when the two valves are touching . . . . . **enodis** (L.)
- Vein 3 rm of forewing curved, forewing without strongly contrasting pale areas; female with saw-sheath that is either acute at apex in dorsal view when the valves are touching, or the valves form a pair of curved callipers . . . . . 7a
- 7a Female with broad saw-sheath valves that almost meet along their inner edge (Fig. 2a); male penis valve (Fig. 3a). Larvae on *Rosa* . . . . . **nigripes** (Retzius in Degeer)



- Female with slender saw-sheath valves that are strongly curved and widely separated (Fig. 2b); male penis valve (Fig. 3b). Larvae on *Berberis* and *Mahonia* . . . . . **berberidis** Schrank

Specimens of *A. berberidis* have been deposited at the Natural History Museum, London; RHS Garden, Wisley; and the BENHS collection at Dinton Pastures Country Park, Winnersh, Berks.

#### DISCUSSION

*Arge berberidis* is now well established in gardens in the London area and it is likely that it will continue to spread. Its most frequent garden host plant, *Berberis thunbergii* and its purple-leaved form f. *atropurpurea*, are widely grown in gardens. It is also extensively used in municipal plantings as formerly it has been a relatively pest-free plant and has thorns to make it vandal proof. Berberis sawfly can cause severe defoliation in early and late summer, so the popularity of this plant may decline. The native *Berberis vulgaris* is less frequently grown in gardens.

As a wild shrub, *B. vulgaris* is widely distributed in Britain, although it is less common than in the past (Preston *et al.*, 2002). This is also the host plant of the RDBI/Endangered Barberry Carpet moth, *Pareulype berberata* (D.&S.) (Geometridae), which occurs in a few sites in southern England. Barberry Carpet larvae feed on the foliage in mid June–mid July, with a second generation in late August–September. A more common geometrid moth, the Scarce Tissue *Rheumaptera cervinalis* (Scop.), has larvae that feed on the foliage in early June–late July (Porter, 1997). *Arge berberidis* larvae will be in direct competition for the foliage with both of these species. Unless natural enemies are able to check the sawfly, the consequences for *P. berberata* could be disastrous.

#### ACKNOWLEDGEMENTS

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